OVEMBER 1979

ICE racing DRIVER

DRiVER

by CAROL CLEWLEY

Carol Clewley is a civilian secretary for NORAD Communications Systems at Peterson AFB, Colo. To compensate for her sedate, week-day duties, she has many weekend interests such as belly-dancing, Elvis Presley, camping and back-packing, skiing, skating, western dancing, cement mixing, genealogy, cooking, sewing, roofing, and ice skating. Some of Carol's ancestors struggled all the way from Tennessee to Colorado in an ox cart during the winter of 1855. Those hardy pioneers might have turned around if they had met Carol racing down the frozen Platte River! She and her husband, Mac (who is a Civil Service Procurement Equipment Specialist at the U.S. Air Force Academy), thought DRIVER readers would enjoy hearing about the most unusual of their hobbies, ice racing!

Rules are read and safety discussed before each race day begins.

Mac Clewley wearing a five-point harness/seat belt combination.

Lisa-the-Labrador especially enjoys the breezy whirl on studs (although those tires aren't on in this picture). The other one is Mac Clewley.

photos by the author

RACING

WINTER! It brings to mind freezing cold, high utility bills, and rotten road conditions. To many people, it also means skiing, skating, sledding, ice fishing, or lying on the beach (in Florida). Trying to push aside dreams of a warm, sandy beach is not easy in Colorado in January as you inch your way to work on glare ice each dark morning. Now we do have water here, but it's usually surrounded by mountains and frozen stiff in winter.

About nine years ago, a few hearty Coloradoans decided to make an asset out of icy streets and frozen lakes and so ice racing, Colorado's newest winter sport, was born. And to some of us, it's just about as much fun as lying on the beach . . . but please don't tempt me with a trade when it's 23° below zero with ground blizzards!

At the first mention of ice racing, three fears usually grip the average person: Will I fall in? Will I get hurt? Will my vehicle look like the last prune in the box afterwards? Maybe the following explanations will help soothe such anxieties:

Fear #1—"Falling In." As little as eight inches of hard, solid ice, supported by water (no air pockets—get a snorkel and go look first, ha ha), will hold up a vehicle. But to take the worry out of having fun, ice racing begins in January. By then, the ice is anywhere from three to six feet thick and lasts until "thaw," usually the end of March. The lakes which are used for ice racing are located at altitudes around 10,000 feet or above in the high mountains. The ice up there often remains frozen until late April. Thaw is approaching when the ice turns milky or green. So as long as the ice has a clear, bluish hue, the wind makes your eyes water, and then the cold freezes the tears on your face, you needn't worry about falling in.

Fear #2—"Protecting My Bod." Safety is stressed above all else in ice racing. In fact, Colorado's No. 1 ice racing club, "Our Gang," has adopted "Safety First" as its motto. During the nine years my husband and I have been participating, no one has ever been injured. Seat belts and roll bars are required, and believe me they give you the security you need, not only for ice racing but in everyday driving as well. You don't need to be sliding around in your seat on icy street pavement anymore than you do on Silver Lake—there's enough sliding going on under the wheels! So first, buckle up!

Roll bars aren't just for decoration either. Most cost around $100 installed—a small price to pay for the three lives in this accident: Several years ago, a young couple with a small baby accidentally drove their jeep off the edge of one of our favorite summer jeep trails near Aspen. The CJ5 rolled seven times and was smashed to a total wreck—except the area between the roll bar and the windshield. Both parents had their seat belts on; the mother was able to hold the tiny baby tightly in her arms, protecting it with her body. Their only injuries were sore muscles! All avid four-wheelers know the value of a roll bar and seat belts; perhaps more topside reinforcement should be stressed on regular autos, too.

Fear #3—"My vehicle vs. the Demolition Derby." There is practically no danger of denting up your machine. The races are usually run in a "dog bone" pattern, which contains curves and very short straight-aways,

continued

Don't stand too close to this driver—she could make minute steaks out of your feet.

DRIVER

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THE EDITOR SPEAKS DOUBLE CLUTCH

THIS AND THAT

Just as we close this issue, actions by the Federal Reserve Board have triggered a sharp rise in interest rates. Sales of new cars will probably be hurt by these higher rates, as well as by the increasing difficulty some people will have in qualifying for loans. Add to this the rising cost of new cars—Ford has just announced another increase—and a lot of us may well decide to fix up the present car and postpone thoughts of a new one.

If you are one of those who has decided to fix up your present car, you should know that NHTSA (National Highway Traffic Safety Administration) has issued a report saying motorists are spending $20 billion a year for unneeded repairs! The NHTSA investigators altered a car and then took it out to various repair shops. Eight out of 10 of these shops either improperly diagnosed and repaired or could not diagnose and repair the problem NHTSA had deliberately caused in the car. There is no suggestion here of fraud or rip-off. The mechanics simply didn't know how to do their jobs!

That doesn't necessarily mean your old car doesn't need some work. It means that you might be paying for work you don't need while the real problem doesn't get fixed. If you don't have a repair shop or mechanic you trust, look up a copy of the October '79 issue and read The Backyard Mechanic's advice on how to find one.

Some problems are caused by neglect of little things like regular check of fluid levels and tire pressure. Anybody smart enough to drive is smart enough to do those things. If you won't do them yourself, buy your gas at the full-service island of your station.

continued on page 29

outlined by markers on the ice. Racing is done in sets of two vehicles, each starting at opposite sides of the course. Winners are determined by a process of elimination in each heat with the final five or so being timed down to the tenth of a second. Sometimes for variety a different pattern is used for the race. One of our favorites is called "Wisconsin" style: Two vehicles start off side by side, separated by a long row of snow to prevent hitting each other; then they each go into different patterns of circles, hairpin turns, straight-aways, and zig-zags, finishing on the same stretch as they started, still separated by the row of snow. This one is a real thriller! It especially reminds me of the icy 32 miles I drive each winter day to work at Peterson AFB. All those cars stuck in the ditch, that truck going sideways up ahead, another coming at me across the median – shoot! It's just Wisconsin style at Georgetown Lake! And you worry about denting up your vehicle in an ice race?

If you're still not convinced, some of our local four-wheel dealerships sponsor "fun days" on the ice. It is a family-type day, with door prizes given away and a chance for spectators to drive a brand new four-wheeler in an ice race. Needless to say, it's very good for the dealers' business, and everybody has fun, too. These races, however, are run in a large oval, must be all stock vehicles, and must have plain tires, radial, mud, snow, or regular tread (bare rubber, we call it). If you miss a corner, you just spiral out across the ice; there's nothing to hit. Obviously, the winners are the ones who maintain the right speed, which must be fast enough and yet slow enough to maneuver the turns. It is a very good first lesson in ice driving control.

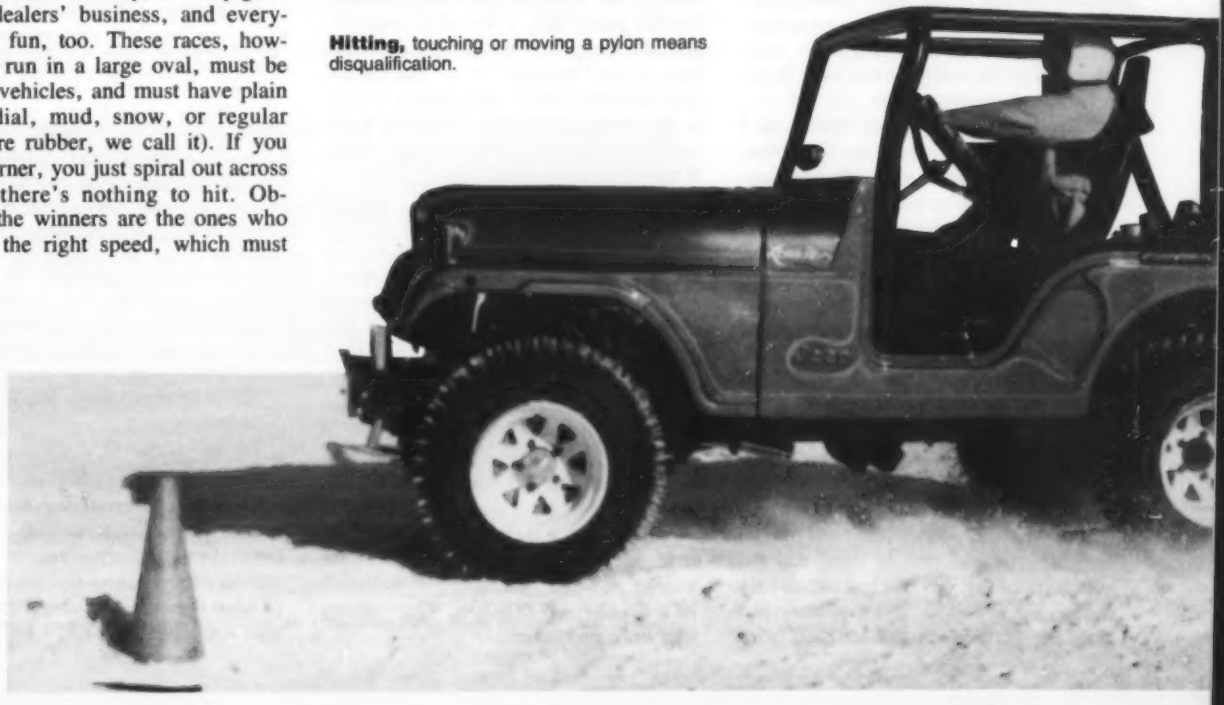
After gaining some courage at an ice racing fun day, many enthusiasts are ready to attend a "Great Ice Race." Here, the competition is very stiff and there are many rules, both for safety and fairness. The dog bone and the Wisconsin patterns, as previously described, are used for these races. You must have a four-wheel drive vehicle and a valid driver's license. Jeeps are by far the most popular ice racer, although Scouts, Broncos, Toyotas, Blazers, and various makes of pickups often enter. The Scouts, especially, corner extremely well on ice due to their sharp turning ability. This, combined with their added weight, seems to miraculously swing the Scout around the corners and set it up for the straight-aways where others may have spun out.

There are all sorts of innovative ideas for the best engine, as in any type of racing. Some have gone so far as to install propane power, turbo chargers, 400 CID (cubic inch displacement)

continued

Lining up the entrants in the ladies' bare rubber race.

Hitting, touching or moving a pylon means disqualification.



engines, high compression pistons, special manifolds, carburetors, headers, power steering, etc. Many amount to several thousand dollars in the finished product of flashy paint, chromed grills, dashboards and roll bars, horns that play a melody, and fur seats. These works of art have appropriate names too: *Bunson Burner, Black Jack, The Quiet One, Super Stud, Quick Silver, The Iron Horse, Dirty George, Four Play, The Green Latrine, 1-2-3, Yukon Jack, Adrenalin,* and *Fairy Canary,* to name a few. We call ours "Mac-the-Quack" and it has a large Donald Duck head on the hood – sometimes these races aren't all they're "quacked up" to be. . . . BUT, you should hear the crowd cheer when an old rusty 1944 Jeep CJ2A, owned by a mine worker in Leadville, overtakes the whole glorious lot and roars off with a first!

No matter how ordinary or fancy a vehicle is, it must have seat belts and a roll bar for the first two racing classes, which are determined by the kind of tires used: Bare rubber and Studded. Bare rubber class, or plain tires, means any type of tire tread with no additives, such as bleach, traction spray, walnut shells, cork, bottle caps, etc., but your ingenuity is encouraged to improve a tire by siping (small slits strategically placed on the tread for better gripping), grooving, or buffing. After all, your ideas may develop safer and more economical transportation.

Minimum allowed tire width is 4 inches, maximum width is 10 inches; minimum tire pressure is 10 psi. Contrary to many beliefs, advice and theories, reduced tire pressure on glare ice DOES help traction, but not on highways at high speeds! Too low a pressure could result in the tires becoming concave on the bottom instead of flat, reducing the amount of tread on the ice. This is not only dangerous, but defeats the entire purpose.

The possibility of the tire rolling off the rim has to be considered too. Therefore, each ice racer experiments to find the best tire pressure for his particular vehicle, which depends on its weight, type and size of tires, and the condition of the ice. It is not necessarily the wider tire with more rubber and gripping surface on the ice that wins either. The 1979 bare rubber champ had 6-inch wide steel belted radials, which have been siped and grooved. The groove was a wide cut around the center of the entire tread, giving each tire four gripping edges instead of two. They were run at a tire pressure of 18 psi.

Also, no steering brake controls are allowed on a vehicle in the bare rubber class. Steering brakes are great to slow you down for the corners to avoid spinning out, but bare rubber class is more than speed. It is truly a test of tires and driving skill. In this class, four and six cylinder engines often do better than those powerful souped-up motors mentioned earlier. Speed on glare ice with plain tires is disastrous! ("Disastrous" in ice racing doesn't mean you join the trout; you simply spin off the course. In all other driving, speed on glare ice can mean a serious accident.)

The second class of racing is called "Studded," using factory type studs, #18 and under, and no more than 20 studs in any 4″ by 10″ area of tread surface. Implement type tires, with studs placed on the diagonal tread, are the most widely used. Much to our dismay, no Alaskan studs are allowed. Several years ago, a friend of ours acquired a couple of boxes of these neat little pointed beauties for us. The Quack (my husband, Mac) immediately rushed to the garage and began pumping them into our regular studded racing tires. When race day came, our little points were all snuggled in amongst the regular studs, hardly noticeable. We zipped around the ice in record time, quacking up the whole time to ourselves about our coveted new secret! But alas, some of the little pointed fellers came out during the race, and an official picked one up. "Hark! What hast thou here?" he shouted in utter disbelief. "Where did you get them? What are they?" Trying to completely throw him and the competition off the track in their efforts to locate our source, we replied, "Why, they are Baja truck studs, available only in Mexico." By the next winter, however, all racing rules listed: NO ALASKAN STUDS! Our victory was very shortlived.

Even though studded tires allow for much faster driving on ice than do plain tires, your chances of turning over or other mishaps are very small. Therefore, only seat belts and roll bars are required for this class, too.

And now to explain the third and most exciting type of ice racing: The Cheaters! This is the only class of ice racing that does have an element of danger associated with it, because of the grooves the "porcupine" (cheater) tires cut into the ice as they round the turns. Add speed (which is attained by the ultimate in traction) and sharp steering to the grooves and sometimes it's up on two wheels and over on your side! For this reason, a full roll cage is required on your vehicle, and you must wear a helmet and a four-point harness/seat belt combination, which inlcudes shoulder straps. Some go a step further and have added a fifth point: That's the one that goes between your legs. It all fastens together in one handy spot, in front. After spending many winter days wiggling in and out of this device (belly-dancing helps), my car's seat belts are virtually a snap to operate. I don't feel dressed without them anymore, and belting up is a good habit to acquire whether cruising around the ice or racing to work!

As another safety feature, the dog-bone race course is always run counter-clockwise because, in the event of a rollover, it occurs on the passenger side (that's considerate, isn't it?) But passengers are not allowed to ride in the cheater class; they may, however, ride in the studded and bare rubber races. Our black Labrador especially enjoys the breezy whirl on studs.

Because of the added safety precautions taken for this particular type of ice racing, to my knowledge no one has ever been injured in a rollover. Ten guys just run out, flip you back over, and the race resumes. It's like the old saying, "An ounce of prevention is worth a pound of cure," and in my case, a couple of years ago, it certainly paid off. I suffered the most serious injury in a rollover to date. When the impromptu pit crew turned me right side up, they were horrified at the sight of what they thought was a severe whiplash – my head looked like it was on

Studded tire class; helmets are not required, passengers are allowed, but seat belts and roll bars, or roll cage (even better) are required in all classes. Timing lights and flags are used for finish line.

Vehicles start at opposite sides of the track between flags and timing lights. Race is run in a dogbone pattern outlined by pylons.

Emergency repairs on the transmission. (Transmissions have been known to blow during an ice race.)

backwards, hair filling the front of my helmet. But, actually, my new wig had slipped down over my face! (Perhaps to avoid scaring someone to death, wigs should be banned on ice racers?)

Over the years, there have been all sorts of creative ideas in the Cheater class. You may do anything to your tires or vehicle that you believe will make it the "grand champ." Steering brakes are great in this race to slow you down on the turns (and prevent a roll-over!), and here is where the powerful, modified engines outperform all others. Pulling those spikes through the ice takes a lot of horses!

Cheater tires evolved first with a set of chains, which slid unmercifully on glare ice, not even doing as well as radial tires. Then they tried chains with reinforcing bars on them, improving traction by about 2%. The most spectacular brainstorming on cheaters, however, goes to the guy who appeared at Crystal Lake about eight years ago. His Jeep was totally chromed (he said it could only be driven after sundown because of the reflection). Instead of tires, he had welded railroad spikes to the wheel rims. They were all chromed too. Looking like Ben Hur at the chariot races, he chunked out onto the ice when his number was called. He and his opponent raced their motors, the flag went up, and there was a huge blur of shaved ice amid a thunderous roar on Ben Hur's side. The spikes dug a hole in the ice, sinking him almost to the frame! He threw it into reverse, backed out and around the hole, and dang near caught up with the other Jeep. It was spectacular! But after that one brief episode, Ben Hur and his chariot disappeared. We never saw them again. He probably figured he'd better quit before all four wheels cut out the race track like a can opener!

The first set of tires with ⅜-inch bolts protruding flat-headed about a half-inch out of the rubber appeared several winters ago. The competition all pounced on the discovery, and each winter they get longer and more pointed. Only watch it! If the spikes are too long, they will fold over and get you nowhere! Three inches is about the maximum length. (See cover photo)

continued

Entrants in the Cheater Class are usually veteran ice racers. It takes a couple winters of driving in the bare rubber and studded classes to finally get up the nerve (and the money) to build a set of today's cheaters. You start with a strong tire, the most popular being a steel belted radial. Drill holes through it and then insert your choice of pointed bolts or ram sets (ram sets are steel spikes used to secure things in cement work). Then place a washer and nut on both the outside and the inside of the tire. Next, using super glue or some sort of bonding cement, stick a liner made from inner tubing over the entire inside of the tire to cover up the protruding washers and nuts. Now insert a tube, put it on the rim, and bring on the air! Sounds simple, doesn't it? Try it – takes all summer. . . .

Cheater tire widths vary from four to 15 inches since there are no set rules in this race on tire size or modification. The rules do state, however, that only four tires at a time may be on the ice (not six or eight!) and the ENTIRE vehicle must finish the race to win. Strange rules? Well, motors have been known to die, transmissions to blow, and drive trains to drop! The rules were tested once during a heated cheater race. Both Jeeps were roaring around the ice, evenly matched; then one hit a marker, disqualifying it. Suddenly, within about 25 feet of the finish line, the other Jeep died and could not be revived. So the driver got out and pushed it across the finish line to victory!

Statistics: To give you some of the distances and times involved in ice racing, the dogbone track is approximately a half mile of turns and straightaways, marked off by pylons. The ice is a different texture each time you race, all in the same day. Sometimes it's snowpacked, or it's been pulverized by the cheater spikes, or roughed up by the studs. Great traction you think for bare rubber? Well, by the time it's your turn, the sun has come out and melted off the top layer, creating the ultimate in glare ice. Therefore, depending upon ice conditions, top bare rubber times vary from 39 to 54 seconds. Studded class record time for the same course is 27 seconds, while the cheater champs roar around it in 19 seconds. Speeds vary from 1-50 miles per hour.

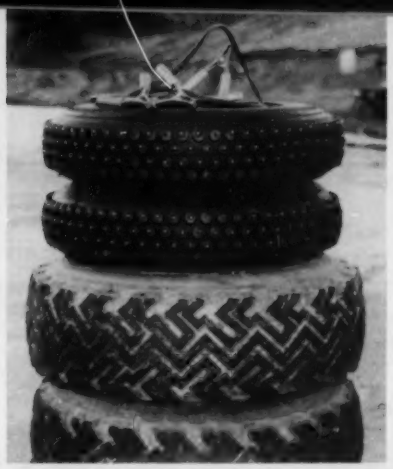
Environmentally, ice racing is not harmful. All traces of it melt with the coming of "thaw." Since the entire area of each lake used for ice racing is usually covered by at least a foot or more of snow, not even the spikes on the cheaters reach the ground below. The State Forest Service has been impressed with our efforts to keep the lakes and surrounding land clean. All litter is picked up after each race, oil or gas spills are wiped up immediately, and frozen chemical toilets are always provided by the race sponsor. We have yet to get a complaint from a traumatized trout about the roaring engines above.

Benefits: Looking beyond the beautiful trophies awarded for successful ice racing, all this seemingly foolish play has resulted in some terrific benefits for the participants. On icy pavement, ice racers are relaxed and at ease. That's half the battle because fear and nervousness cause many accidents in icy winter driving. We've learned how to turn into our skids on ice, recover, and charge ahead; we know that tapping lightly on the brakes will slow you down correctly on ice without sliding. A slow acceleration is best for starting on glare ice, followed by a steady even pace; short bursts on the gas will sometimes speed you up a little more, but if the rear end starts to slide, you're overdoing it. To recover, let up on the gas and steer toward the direction your back tires are sliding.

Seat belts are second nature to us, and we know their value all too well. We also know that carrying emergency equipment, such as jumper cables, a good jack, kitty litter, wrenches and other various tools, wire, furnace tape, a crow bar, flashlight, etc., can get you home while someone less prepared calls for a wrecker. Ice racing has made many women like myself more aware of the automotive world. In the beginning, just the men ice raced; the children skated and sledded, the dogs chased snowballs, and the women watched. We got tired of that in a hurry! Now, each of the three classes of ice racing has a Powder Puff race where the women compete under the same rules as the men – and sometimes we even have better times than they do! Sharing in the fun means sharing in the work, so many women can be seen changing tires (a total of 12 per vehicle by the end of the day if all three classes are run), adjusting carburetors, checking air pressure, etc. As a result, these women are more self-reliant when driving alone in everyday traffic. Changing a flat is a piece of cake to us, and if stalled we can at least lift the hood and make a couple of good guesses!

Some still might say it's all expensive hogwash; at times, it has even seemed that way to us. But an icy night last November convinced us otherwise. My husband, Mac, and I were on our way to his favorite elk hunting grounds, which almost turned out to be the "happy hunting grounds." We were pulling a 19-foot camping trailer with our Scout II. It started to snow, so Mac engaged the four-wheel drive and put the hubs in, although the pavement wasn't icy yet. In about three miles we rounded a curve on that two-lane mountain highway which was covered with solid black ice (leftover from a previous storm). To the left was a 40-foot drop-off; at the right was a rocky embankment. The trailer was pushing the Scout toward the drop-off and we were sliding! Mac steered into the skid (which is hard to do when you can't see anything but pitch black air beyond the edge of the road). It recovered for all of one second and then slid to the right, the rocky bank swishing past my window. (Neither of us panicked, but I do recall sucking in my breath rather sharply at this point.) Then we again slid to the left, then back to the right, using the entire highway. Luckily, no one else was anywhere in sight. Throughout the whole ordeal, Mac-the-Quack kept his cool and drove just like he does at the ice races, only with the added weight of the trailer it took longer to straighten it out. Our only damage was a long green streak on the trailer, left by a thin steel marker post we blessed on the fourth swerve. Four-wheel drive, steel belted radial tires, an anti-sway bar on the trailer's equalizer hitch, and nine years of ice racing had just paid off in less than 30 seconds!

On-the-spot repairs and carburetor adjustments for high altitudes are part of ice racing (this one suffered a coronary!).



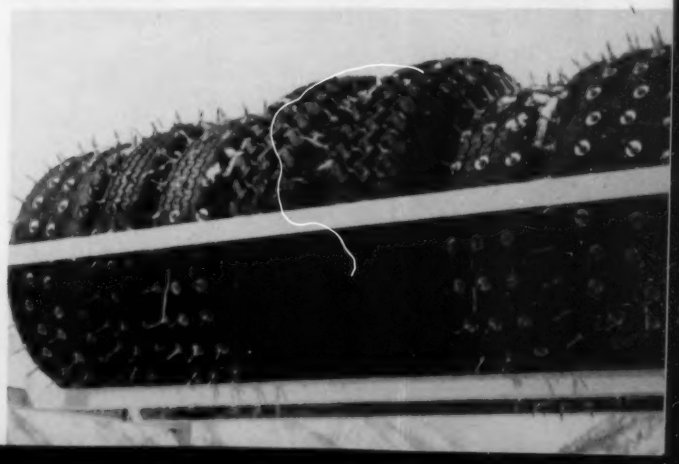
Narrow studded tires often do better than wider ones.

By the end of the race, this poor feller will have changed 12 tires on this Jeep—4 bare rubber, 4 studded, and 4 cheaters. (Tire in foreground has been siped and grooved—note groove around center.)

Jill Kissell and Eileen Grimes of Leadville, Colo., had top times of 39 and 39.7 seconds in the Ladies Bare Rubber race for 1979, driving a "rusty 1944 Jeep."

Most popular ice racing tires for studded and bare rubber classes: (1) Implement tires with studs; (2) tires with siping (small slits in tread) and grooving—seen around the center of tire, which gives four gripping edges per tire instead of two—this was 1979's top bare rubber ice racing tire.

Cheater and studded tires on tire rack. The ultimate in traction is obtained by using ram sets (normally used in cement work, shot into concrete by an air gun). They are secured both inside and out by washers and nuts.



Corvette, America's only sportscar, has dropped nearly 250 pounds for 1980, with increased use of fiberglass. Its front air dam and rear spoiler are integrated into the bumper covers for a cleaner, more aerodynamic look. To provide greater fuel economy, but no loss of lower end performance, Chevrolet has put wider gear ratios in the 4-speed manual transmission, allowing a lower axle ratio.

GENERAL MOTORS

With General Motors, the big news for 1980 is probably well-known to you by now—the coming of the X-body cars. GM introduced these new compacts last spring and they have become very popular.

As for the rest of the line-up, the changes for most aren't immediately apparent. True, the full-size sisters from Pontiac, Oldsmobile, Cadillac, Chevrolet and Buick have been restyled to give them more aerodynamic characteristics, and therefore greater fuel economy. And then there's that trunk on the Seville, which recalls styling of the 1940s.

But the major changes otherwise are under the hood. GM has continued putting smaller engines in its cars to increase its Corporate Average Fuel Economy to meet government standards. With gasoline having exceeded the dollar mark this year, that should be good news to car buyers.

Another fuel-saving idea at GM is a torque converter clutch on automatic transmissions. The clutch automatically engages at about 30 mph and disengages below 30 mph, or when the brake is depressed.

Take a look at the few selected cars on these pages. You may see something you'll like.

the rest of the 80s

A LITTLE GALLERY TO GO WITH LAST MONTH'S CARS.

The Caprice Classic and Impala have been put on a diet. With their new standard 3.8-liter V6 engine they weigh 140 pounds less, and with the V8 they are 100 pounds lighter. Chevy rates the V6 at 18 miles per gallon in the city and 26 mph on the highway.

The changes for Camaro are under the hood, aside from a few cosmetic alterations. The Z-28 will keep its 5.7-liter V8 (5.0 liter V8 in California), but all the others will change. The standard engine is the 3.8-liter V6 in the base Camaro, Berlinetta and Rally Sport. The other available engines are two small V8s, a 4.4-liter and a 5.0-liter.

Monte Carlo joins the growing number of GM cars with turbocharged powerplants. The turbocharged 3.8-liter V6 measures out at about 170 horsepower. A normally aspirated 3.8-liter V6 is standard, with 4.4 and 5.0-liter V8s as options.

Chevrolet Suburban, like all Chevy trucks, has been re-engineered for greater fuel efficiency. The changes include the torque converter clutch system, a new exhaust system and a thermostatically-controlled fan.

Cutlass, Oldsmobile's best-seller, has added three four-door models to its line. The new notchbacks bring the Cutlass line to 10 models.

GM's X-body cars, including this Oldsmobile Omega, continue their popularity. They were introduced last spring and remain unchanged for the fall.

Olds Delta 88 and the other full-size Oldsmobiles have all new sheetmetal which makes them more aerodynamic. A 3.8-liter engine is standard on 88s, and a 5.0-liter is standard on the Ninety-Eights. Both have an available 5.7-liter diesel as an option.

Oldsmobile Starfire again offers the sporty Firenza option as a draw to the younger driver. Colorful striping, front air dam and rear spoiler are featured. A 3.8-liter V6 is the largest engine offered in the Starfire.

continued

80 81 82 83 84 85 86 87 88 89 CADILLAC

Cadillac Seville has the most eye-catching change this year, with its 1940's style trunk. The front-wheel-drive sedan is powered by a standard 5.7-liter V8 diesel engine (5.7-liter gas V8 in California).

Cadillac Coupe de Ville has been restyled for 1980 to provide greater fuel economy. Coupe de Villes and Fleetwoods are powered by a standard 6.0-liter V8 engine.

80 81 82 83 84 85 86 87 88 89 BUICK

Buick LeSabre is another of the GM full-sizers that have been given new sheetmetal this year. At the same time it has been made about 100 pounds lighter. A standard 3.8-liter V6 powers the LeSabre.

Buick Century is redesigned for 1980, with a notchback replacing the four-door fastback of last year. Its standard engine is the 3.8-liter V6, with a turbocharged version available on the Century Turbo Coupe.

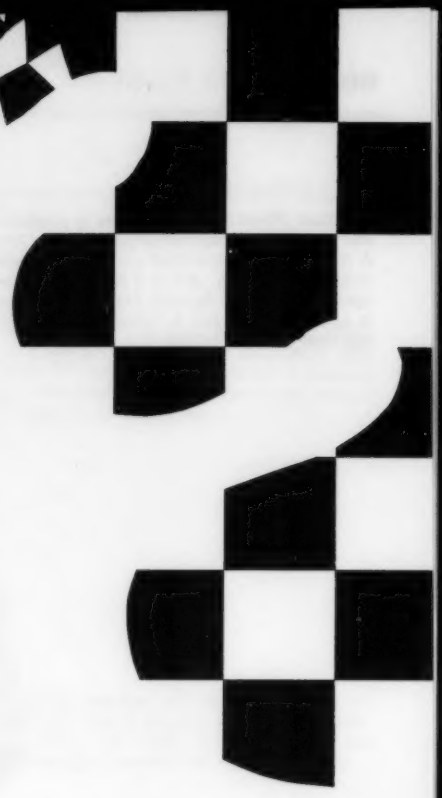
Pontiac Firebird Trans Am is available this year with a turbocharged 4.9-liter V8. A 3.8-liter V6 is standard on base Firebird and Esprit models, with a 4.3-liter V8 as an option. The Black Special Edition Trans Am is again available and a Yellow Bird for 1980 replaces 1979's Redbird.

Full-sized Pontiacs have lost about 100 pounds for 1980. They have been made more aerodynamic by lowering hoods, raising deck lids and adding air dams. A 4.3-liter V8 is standard on the Bonneville Brougham (shown), a 3.8-liter V6 for the Bonneville and a 4.9-liter V8 on the Catalina.

Phoenix, Pontiac's X-body, was introduced with the other Xs last April. It is powered by a standard transverse 2.5-liter L-4 engine. The SJ option (shown) features two-tone paint and striping.

Grand Am has been turned into a performance car for 1980, with a 4.9-liter V8, rally gauges, rally RTS suspension and custom sport steering wheel. It is available as a two-door coupe model only.

MOM'S A RACE DRIVER



Loading the kids and hubby into the mini-motorhome usually signals a family vacation that's well underway for most wives. And if they're headed for Southern California, a stop at Disneyland is always included in the schedule. However, most mothers would draw the line when it came to a stop at Ascot Park. This ½-mile clay oval race track hardly rates at the same level as amusement parks, or television and movie studio tours. Not only is the track located on a land fill next to a bus garage in Gardena, but race cars are terribly noisy and tend to deposit dust and dirt from the track's surface on everything in the area including people.

Well, that's *most* mothers. For Sharon Bishop, the stop at Ascot is the reason for the trip. The vacation tours of Southern California are an enjoyable extra.

If you're thinking that Sharon is one of the wives who actively supports their husbands' racing efforts right down to being a go-for, you'd better rethink your role models. In the Bishop family, Mom's the race driver.

And she isn't just putting around at a local track with the other wives either. Sharon Bishop campaigns in the National Association for Stock Car Auto Racing's tough Winston West Grand National series. In fact, she's in the top-10 points standings on the 1979 season.

Sharon's running against the best stock car drivers on the West Coast on every type of track from a ¼-mile paved oval to a 1.7-mile road racing circuit. And, as she puts it, "is having a ball."

How does a woman become involved in driving stock cars? Listen as Sharon explains.

"Well, way back when, in about 1970, we were still in the military then – in the Navy – stationed at Bangor. Bruce was the dock master and one of his chiefs who ran a tug kept saying, 'Hey, Boss, on one of these Sunday afternoons when you don't have anything to do, why don't you come out to the race track and watch me.' So we finally did one Sunday afternoon. The next week Bruce was in whites, in the pits and it's been racing ever since.

"We didn't start driving until '73. He was driving; I was powder puffing (racing against other women as a side event to the main program). But a couple of years of powder puffing and I wanted to race more. So we bought another car and we raced two cars. In fact, we raced against each other for awhile, which the crowds adored. Then we financially or physically couldn't handle two cars, so now he does the wrenching and what have you, and I do the driving. It's pretty hard to maintain a car and drive it too."

Sharon drives cars that started life on American assembly lines. However, for racing about all that is "stock" is the body appearance. These vehicles are so completely rebuilt for racing speeds and safety that sometimes even their engineers don't recognize them. Beefed-up frames, suspensions and brakes are powdered across racing surfaces by horsepower-abundant engines while the driver is protected from all outside forces by a cage of steel tubing.

For the Bishops the turning point that now takes them border to border came when they were planning their 1978 car. In 1977 they had been running what NASCAR calls Late Model Sportsman. Sharon was ranked 16th in the Northwest, 15th in Washington that year.

"We enjoyed that," says Sharon. "So when we built the Nova for the '78 season, we decided we'd build it Grand National legal and go play at a few races that they had up in the Pacific Northwest." Without getting too technical, the difference between Grand National and Late Model Sportsman comes in body years. While the LMSs can go back as far as 1965 and up until the previous model year, Grand Nationals must have bodies from the current or previous three years. There's also a minimum weight requirement of 3,500 pounds for Grand National West competition.

"We enjoyed Grand National West so much," Sharon stressed, "we put a new body on it so we could update." By putting a 1976 Pontiac Ventura body on the race car, it can be updated through 1979 by changing the nose. Projecting that into the current three-year Grand National scale means the Bishops could race the same vehicle until the end of the 1982 season.

Commenting on NASCAR racing, Sharon says, "I think it is the safest, because they (NASCAR officials) are very safety conscious. They just will not tolerate unsafe equipment. They inspect the cars very thoroughly." And she's not just referring to the beefed-up components that must take the stresses of racing. Sharon's talking about heavy steel tubing roll cages that protect drivers in case of accident. She's talking about three-inch wide belts that keep them from moving around in the vehicle. She's talking about helmets. And even on-board fire control systems, plus much, much more.

On and off the track Sharon says she's "not really" heard or caught any flak from her male counterparts. "They don't really pay much attention to the fact that they've got a woman driver among them," she observes. "Just another car, another driver. Nobody really says too much in the pits. Promoters have fun with it," she says, "but that's fine."

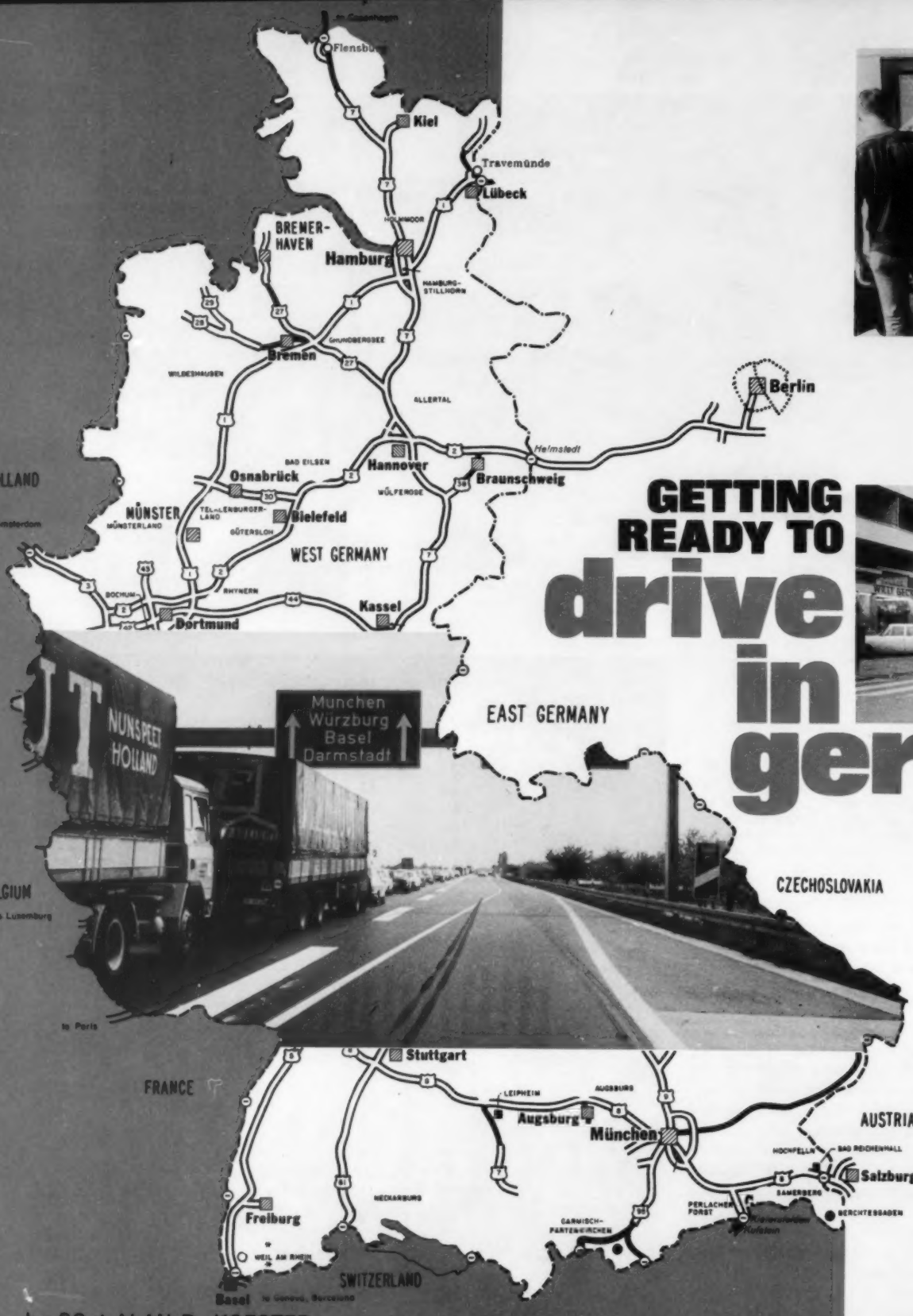
Mid-way through the 100-lap event finds Sharon's Pontiac (96) being lapped on the outside by Rick McCray's Buick (08). Sharon finished sixth to McCray's fourth.

(right)
Sharon Bishop thinks about what her husband Bruce is telling her between hot lapping and qualifying at Ascot. She's also remembering that it's been three years since she last raced on an unpaved track.

Then she straps her helmet back on, climbs through the door window of the waiting race car and prepares to take on the best West Coast stock drivers for the 20th-plus time this year. On this particular Saturday night Sharon Bishop will qualify 14th and finish 6th after 100 laps on the clay Ascot oval.

And the next morning, she, Bruce and their two daughters will tour Disneyland and other Southern California attractions. Then it's back to their service station/wrecker service/rental business in Centralia, Washington – until late-November when it's off to another race.

GETTING READY TO drive in germa



by SSgt ALAN R. KOESTER
Rhein-Main AB, Germany

(left) **A typical group of people** assembled at Station 1, in building 101 at the VPC in Bremerhaven to begin processing to pick up their POVs. Those sliding panels in the background are the Post Exchange Parts Window. (right) **This is where it all begins**—Registry of Motor Vehicle Customer Service Center. It's here that you begin all the work.

many

Before you can give any thought to registering your privately owned vehicle, you must obtain a license to drive in Germany. Your unit orderly room will issue you (on a temporary basis) USAREUR Pamphlet No. 190-34/USAFE Pamphlet No. 125-11, titled "Military Police Drivers Handbook and Examination Manual for Germany." This is to assist you in preparing for the driver's license examination. If you don't study the book, it's almost impossible to pass.

The test, which is administered by the Base/Post Driving School, consists of 100 questions, of which you are allowed to miss only 10. If you miss more than that, you've failed. Some people have to make several attempts. If you fail to pass after two attempts, however, you will have to wait 14 days before you may try again.

When you've passed the written examination, you are then handed a sheet containing 50 International Road Signs, along with another sheet telling you what they are. You must match the answers with the correct signs. If you miss more than five signs, you've failed this portion. However, you will have to take only the sign part of the test over again. Incidentally, you can study these signs and their meanings before you ever leave the United States. You'll be that much ahead when you get here.

Once you've passed that, you will be issued a temporary driving permit. It's good for 30 days. Send your application to Hq USAREUR Heidelberg, Germany along with a fee of $3 and your license will be mailed to you.

Now you are almost ready to pick up your POV when it arrives. First there are insurance requirements that must be met. Your best bet is to contact a reputable insurance agent. He will help you select the type of insurance that is best for your needs. You may find that insurance with a German firm suits you and is easier on your budget, but insurance with American companies is available. Let the agent explain both tariffs, then decide. Without insurance you will not be able to register your POV.

The notice comes. The car's here! Now you must go to Bremerhaven and pick it up. Family Services maintains a list of people who are taking cars to the port for shipment and names of those who are going to pick up a car. Check and see if anyone is driving up there. You need a ride to the port, and he needs a ride back. If you cannot make an arrangement of that nature, you may consider going by train. Railroads in Germany are among the best anywhere. If possible you may consider going to the RTO Office in Frankfurt and trying for space available on the Bremerhaven Duty Coach. (Military members can call ahead for a reservation but dependents will be space available.) Space is limited and if you don't get on the coach, and there is generally a large group that doesn't, the railroad offers a special group rate to ride the same train. The larger the group, the less you pay.

The train leaves Frankfurt at 2245 hours and arrives in Bremerhaven in the morning at about 0630. If you're on the "Troop Train" you will go straight through. If you pay, you will change trains in Bremen and arrive about 10 minutes before the troops do. In front of the Bremerhaven RTO Office (in the front of the train station) is the military shuttle bus stop. This is the bus that will take you to the Vehicle Processing Center (VPC) Station No. 1. It also stops everywhere else on the post. Make sure you have the following documents in your posession when you arrive at Station 1:

A. A valid USAREUR drivers license.

B. Double white insurance card.

C. Two (2) completed AE Form 1958s, application for motor vehicle registration and allied transactions (available at your unit orderly room; E-6s and below require commander's signature in item 28).

D. Cash, check or money order in the amount of $3 for USAREUR registration fee, plus funds to help defray unexpected costs.

E. Owner's copy of DD Form 788, Privately Owned Vehicle Shipping Document.

F. One (1) complete set of POV keys.

On arrival at the VPC, building 101, go first to Station 1 with your documents; Station 2 is the vehicle parking area; Station 3 is the USAREUR Inspection Station; Station 4 is where you install the accessories and check for damage and theft; Station 5 is the Import Section (Customs) where new cars go. It's here that you file your damage and pilferage claims.

continued

continued

Station 2—the vehicle parking area. It's here that you'll find your POV. Personnel at Station 1 will assist you by providing information on the general location of your vehicle.

At the USAREUR Inspection Station (Station 3) Joan Koester watches as SP/4 David Smaglinski of the 570 Military Police Platoon, Camp King, parks his van on the rack for inspection.

Finally you proceed to the Registry Window and are issued your plates.

Once you have your registration, you may purchase your gasoline coupons at the parts window in building 101 if you didn't buy them in advance. German law requires you to have a German-approved first aid kit and emergency warning triangle. These items are also available at the parts window. A word of warning: If your car needs repairs or for any reason fails to pass inspection, you can expect to wait as long as three or four hours to have your car repaired, sometimes longer. The delay is because there are so many vehicles processed through the VPC daily.

Now you've filled up the tank with gas and you're ready to roll. Make sure that you pick up the detailed map of the Autobahn routes in Germany; it's available at the Post Exchange in Bremerhaven (also available at all AAFES outlets in Germany and West Berlin). This map shows all the Autobahn routes and the location of service stations that honor the gasoline coupons you purchased at the port. You will find it an invaluable aid when selecting the most direct route back to your duty station.

Now it's out to the Autobahn. There's no 55 mph speed limit, and no worrying about "Ol' Smokey Bear" sneaking up behind you. German law requires you to operate your motor vehicle safely and with consideration for others. Wear your seat belts. Ger-

At Station 4 your plates will be put on by the attendant. It's here that you inspect your vehicle for damage, and check the inventory sheets to see if anything is missing.

This is just outside the main gate of Bremerhaven and gives a good idea of how wide the roads are. Traffic, however, is not always this light. Driving through a German community can be a very pleasant experience.

man law says that if you don't you may not be compensated for damages resulting from an accident, even if the accident was not your fault.

Weather and road conditions may require you to reduce your speed in the interest of safety. Common sense and sound judgment are key ingredients of driving on the Autobahn. You are still held responsible if your excessive speed and negligence endangers others and causes an accident – even though you were otherwise in the right. It's the law and it is enforced. German Police are empowered to arrest you if the situation warrants it.

Watch for built-up areas, and observe the signs. Speed limits may be imposed for a construction area or for other reasons.

Your attention should also be directed to those new radial tires you had put on your car before you shipped it. Those tires were constructed to United States specifications and may have been tested and guaranteed for reasonable American freeway speeds. Driving at consistently higher rates of speed may cause tire failure, loss of vehicle control, and an accident. We hear that this has been the cause of several accidents involving U.S. military personnel here in Germany. So think about your tires and know their limitation.

If you have any maintenance problems while driving on the Autobahn, pull off the road, turn on your emergency flashers, and then place your emergency warning triangle about 100 meters behind your vehicle. Lock your car (it's the law) and proceed to one of the strategically located emergency phones. Pick up the receiver, and don't panic if the operator you're talking to doesn't speak or understand English. The operator has equipment that shows the location of the instrument you are speaking from and will notify the German Autobahn Patrol who will come to assist you.

Roads in Germany are different in some ways than those in the United States. For example, Autobahns are similar to our freeways but not when it comes to entrances and exits. In the U.S. freeway entrances and exits are banked on a slight incline to help you maintain control of your vehicle. Some Autobahn entrances and exits are as flat as pancakes and you must be careful. The posted speed limits are your best assurance of safety here.

These are some of the first international road signs one encounters upon leaving the post. They are basically direction signs. In this case, Autobahn direction signs.

There are B Routes and Europe Routes. Though not Autobahns in all cases, they are good roads to use and are in many cases major highways. Others go through towns and cities. When that is the case, adjust your driving accordingly. Rural routes and country roads are virtually the same no matter where you are. You must be prepared for the unexpected at all times.

Weather is an important factor here. Roads are slippery when wet, particularly just after rain has started to fall. "Black Ice" is common here in the winter. For those of you who are not familiar with it, black ice is a clear patch of ice which blends in with the color of the pavement (be it black, brown, tan, etc.) and you will not see it until you are right on top of it or already skidding on it. By that time it's too late to do anything but try to steer out of the skid. In general, the roads here are constructed well, and are constantly maintained.

Driving here, you must drive defensively (as you normally do?) because German drivers are not necessarily like those you shared the road with back home. They will take a four-lane highway and try to make it eight lanes. It's not unusual for someone to fly past you, turn on his turn signal, cross in front of you and make a right turn two or three hundred yards down the road.

German drivers start out from a traffic light when it changes from red to amber. By the time it switches from amber to green the traffic is moving. If the light turns green and you don't move out immediately, you'll hear a chorus of horns behind you. Of course there are the ones who drive like they own the road. Come to think of it, you meet that kind of driver in every country. It's no different here. You have to drive your car, and mentally drive the other fellow's car too! Smart, defensive driving – that says it all!

(Editor's Note: The USAFE safety folks have compiled a study guide consisting of 500 questions about licensing, registration, and right-of-way rules in the Federal Republic. The 100 questions you will be asked on the licensing exam are selected from these 500. The study guide – also called the master question file – was tested at several installations last summer and proved very helpful in preparing people to pass the license exam. It should be in general use by early spring and will no doubt put an end to "test fears.")

fuelish remarks

It's all in the planning

DRIVER provided winter driving tips while the tongue-in-cheek Backward Mechanic hinted at ways to increase miles per gallon last month (October 1979). A natural question evolved out of the two articles: How can I improve my cold-weather fuel economy?

There is a one-word answer: Planning.

Plan to avoid unnecessary cold starts. Plan maintenance of the vehicle and tires. Plan braking. Plan speeds. And plan to avoid congested areas.

If all this sounds familiar, it should. These are also the tips for improving fuel economy any time of the year. But in colder weather these tips must be carried a step or two further.

To begin with, plan to combine as many small trips as possible into one longer trip. This point can't be overstressed, especially when some cars are getting five to six miles per gallon during cold weather short trips.

Now that we've scheduled the next day's travel, let's not forget to put that tarp over the windshield. This way the car won't have to run for 30 minutes to get up enough defrost heat to make it possible to scrape the ice off. After all, a running, parked car is getting zero miles per gallon! And as you have planned for the cold weather, you've already stocked up on cans of window deicer to help clear those areas not covered by the tarp, right?

After starting the car, don't go back in for a second cup of coffee. We know you like a nice toasty warm ride to work, but remember it's only 68 at the office. And when it is also 68 at home and below zero outside you dress accordingly. So who wants the sweat on their forehead to freeze when they get out of their car in the office parking lot?

OK, as soon as the car will stay running, go! Don't gun the engine for the first few miles – this will also keep you from getting stuck – and you won't hurt the mechanical parts of your vehicle any. Vehicles do warm up faster when driven than when left running while parked.

Without getting too technical, here's what's happening. In a cold car there are numerous items contributing to poor fuel economy. The choke or fuel enrichment system is dumping raw gas into the cylinders to keep the motor running. The cold motor oil is making the engine work hard to keep going. The transmission fluid and axle lube are also offering resistance. The choke and engine oil are warmed whether the car is moving or not, but the transmission fluid and axle lube aren't. Got the picture?

The maintenance planning starts with engine oil. SAE 30-weight oil is so stiff at zero-degrees fahrenheit it can actually keep a car from starting if the electrical system is marginal. Therefore, follow the manufacturer's recommendations for motor oil weight according to the weather you're expecting. A word on synthetic oils: because they have a constant viscosity, hot or cold, they make a huge contribution to efficient warm up.

Tires are another area where it is almost impossible to overstress proper maintenance – read: inflation. First of all, for the winter you want proper inflation because then the tire will perform to its maximum in providing foul weather traction.

Properly inflated tires also contribute to fuel economy. If a tire requires 24 psi and you have only 16, the rolling resistance is increased 31 percent. The 31 percent rolling resistance increase will cost you about 6.2 percent in fuel economy.

Now don't go to extremes with inflation either. Increasing that 24 psi tire to 32 psi will gain you only about 2.2 percent in fuel economy. Going to 40 psi is good for only another one percent.

While we're on the subject of tires, radials offer 18 percent less rolling resistance than bias-belted tires and 30 percent less than bias-plies. That 30 percent represents a six percent increase in fuel economy.

As with a cold engine, warm tires offer 40 percent less resistance than cold ones.

Planning your braking and planning your speeds go together of course. As many safety publications have been pointing out lately, "If you had to brake hard more than once in the past year, it's time to re-evaluate your driving habits." Safety-wise, that's hard to argue with, but the fuel economy tie-in may be vague. What it boils down to is: when you use the brakes you've gone faster than necessary to get to that point. And by having gone faster you've wasted fuel. Look ahead and plan ahead so that you don't have to use that stopping power and you'll be miles ahead in the mpg game.

Braking carries over into avoiding congested areas. Congested areas force you to use your brake and therefore waste fuel. A 1976 Transportation Research Board study of Washington, D.C., showed that when traffic slowed from 20 to 10 miles per hour because of congestion, fuel economy dropped from 11 to seven mpg. Stay out of traffic jams; it is easier on your gasoline bill – and your nerves.

Regardless of the time of year, fuel economy is all in the planning. Consolidation of trips, proper maintenance of the vehicle and tires coupled with planned braking, speeds and congestion avoidance adds up to more miles per gallon.

the braking game

If you think planned braking is bull, consider this game race drivers play with themselves for practice while driving on the street. They constantly practice braking so smoothly that it is almost impossible to tell the difference between when the vehicle is rolling and when it has stopped. This is for what they call "feel."

You can develop the same control and "feel" by playing their game. And at the same time you could improve your miles per gallon. After all, the best way to do the trick is to not use the brake pedal at all.

While we're on the subject of using the brakes, consider how Niki Lauda, twice World Driving Champion, uses his. The instant before he needs them, he pushes the pedal in far enough to "feel" that they are going to come on equally and not pull to one side or the other. This way there are no surprises. Besides it allows the brakes to settle into position as he backs his foot off just enough to release them before pushing back to get the slowing power he needs.

As you can see, there is more to braking than jumping on the pedal. And the end result can be more miles per gallon.

the backyard mechanic back to basics

The principles are easy, it's the chain that's greasy

Maintaining a safe motorcycle protects you and others. Whether you actually do the work or have someone do it for you, understanding the basic principles of motorcycle maintenance will provide the background necessary to spot problems before they become disasters.

The first rule of good motorcycle maintenance is to know and follow all the owner's manual instructions. Read it cover to cover. The manufacturer knows exactly what is required to keep the bike running well. The manual tells you how to operate your cycle, maintain it, diagnose trouble, keep up the appearance and get service. It also provides tips on safe driving as well as useful time and money-saving advice.

The owner's manual is a part of the basic tool kit you always carry on your motorcycle. Most dealers have small road-side emergency tool kits for your bike. If you're making your own, the tool bag should have: 10x14mm, 17x 19mm, 9x12mm and 10x13mm open-end wrenches; a spark plug wrench; pliers; slotted screwdriver, and two sizes of Phillips screwdrivers.

Experience with your bike will tell you what spare parts are necessary to carry. If you don't have this experience, tap your dealer's or another owner's knowledge.

The best single tool in your home workshop will be a service manual for your make and model of bike. If your dealer can't sell you one, check out any of the national motorcycle magazines for ads from companies that do. You might also consider a general motorcycle repair book, provided you check to be sure your bike is covered in the specific model section. Even if you don't do your own maintenance, you'll find the service manual to be an excellent investment. Especially when it comes to trouble-shooting problems.

Tools necessary for basic Backyard Mechanic work include: combination wrenches, socket wrenches, assorted screwdrivers, pliers, feeler gauges, spark plug gauge, spark plug wrench, small hammer, plastic mallet and parts cleaning brush.

Emergency tool kits for small road-side repairs are available from most dealers. If you can figure a way to include your service manual in the kit, so much the better; however, you'll usually have to settle for the owner's manual instead.

There are also some specialized tools that you'll require. They are:

Flywheel puller for removing the flywheel to get to the ignition points;

Timing gauge; although a vernier scale will work, it's not as fast or easy to use;

Ignition gauge for those bikes with magneto systems that often require adjustments through narrow flywheel slots, and

Timing tester to tell when the breaker points are open. However, we'll tell you how to use a voltmeter or test light instead.

Other specialized tools that the serious mechanics will want to include: a hydrometer, multimeter or VOM, compression gauge, impact driver, and carburetor synchronizer (for multi-carburetored motors).

Let's not forget the expendable supplies. You'll need grease, oil, gasket cement, wiping rags and cleaning solvent. You should be able to get all these at the Exchange, local gas stations or auto parts stores. You can probably sneak a little distilled water for your battery out of the spouse's steam iron supply. A can of penetrating oil wouldn't be a bad idea either.

Before tackling any job large or small, read the entire section covering that job in the manual. Study it and have a good idea of what's involved before starting. You'd be surprised at the number of "tips" that would help in step 17 that are hidden in step 59. Also, have those specialized tools on hand *before* beginning the project.

It'll be easier to work on the bike if it is clean first. There are numerous specialized cleaners for washing engines and related parts. Simply brush or spray them on, let 'em set and rinse off with a garden hose. Use cleaning solvents only for oily or greasy parts. Gasoline's extreme fire hazard makes it a no-no as a cleaner. Besides, it's not cost-effective. And make sure your work area is well ventilated when using any solvent.

Start the tune-up by removing the spark plug(s), making sure to note which plug came from which cylinder on multicylinder engines. From a used spark plug a trained observer can tell much about engine condition and car-

motorcycle maintenance

The best single tool in your home workshop is the $8.95 one in the top center of this picture—a service manual for your make and model bike. If some of these tools look unusual to you, you'd better find a knowledgeable friend before starting your own maintenance.

buretion. Before removing the plug, clean the area around the base to prevent dirt and other matter from entering the cylinder. Use a proper size spark plug socket when actually loosening and pulling the plug.

If the plug is difficult to loosen, apply penetrating oil to the base. Allow it to work for 20 minutes before trying again. You might also give the cylinder a light rap or two with a rubber or plastic mallet. This sets up a vibration which helps the penetrating oil work in. When replacing plugs, use anti-seize to avoid having this problem again.

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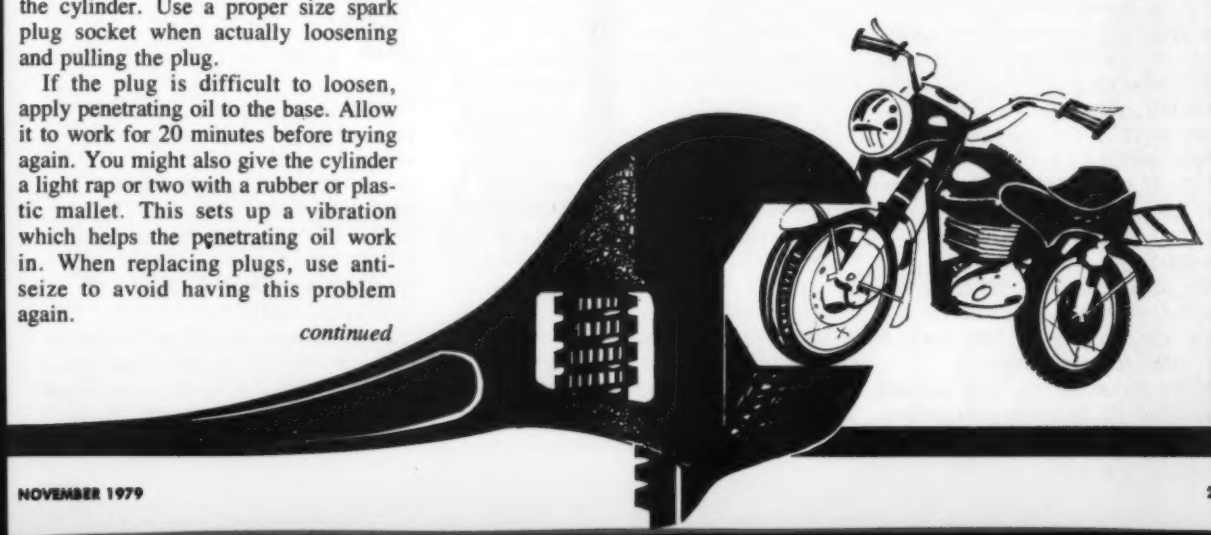


Various conditions are indicated by the removed plug. They include:

Normal – A light tan or gray deposit and no abnormal gap wear or erosion indicate good engine, carburetion and ignition.

Carbon Foul – Soft, dry sooty deposits are evidence of incomplete combustion usually attributed to rich carburetion. Other causes include weak ignition, retarded timing or low compression.

Oil Foul – Black insulator tip, damp oily film over firing end and carbon layer over entire nose may mean the spark plug is too cold (the wrong heat range). Other causes include:

Four-stroke engines; worn piston rings, worn valve guides or overfilled crankcase.

Two-stroke engines: Improper fuel/oil mixture, wrong oil, idle speed too slow, idle mixture too rich, clogged air filter, weak ignition, engine idling too long or oil pump out of adjustment.

Whisker Foul – Thin, hair-like material bridging gap indicates a dirty air filter.

Gap Bridging – Gaps shorted out by combustion chamber deposits fused between electrodes are caused by poor oil control in four-stroke engines. This can result from worn piston rings or valve guides, or maybe an overfilled crankcase. With the two-cycle power plant this may exist with improper fuel/oil mixture, clogged exhaust or misadjusted oil pump.

Overheated – Burned electrodes with light gray or chalk white insulator tips are exhibits of overheated plug. This is commonly caused by using a plug of the wrong heat range (too hot). If the plug is right, then other possible causes include lean fuel mixture, engine overloading or lugging, loose carburetor mounting or timing advanced too far.

Worn out – The electrodes are eroded. The plug's been in the corrosive gases of the combustion chamber under high voltage for too long.

Preignition – Melted electrodes and/or white insulator indicates sustained preignition. Check for the wrong heat range plug (too hot), or loose carburetor mounting.

Except for worn out, gap bridged, overheated or extreme preignition, spark plugs may be cleaned, regapped and returned to service. However, since spark plugs are relatively cheap and restoring old ones takes a lot of effort, such service may not be worth it.

safety first

- Never use gasoline as a cleaning solvent.
- Never smoke or use a torch near flammables such as cleaning solvent in open containers.
- Never smoke or use a torch near a charging battery.
- If welding or brazing on a machine, remove the fuel tank to at least 50 feet away.
- Use proper size wrenches for turning nuts.
- Think about your hand slipping when working with a tight nut.
- Keep the work area clean and uncluttered.
- Wear safety goggles when drilling, grinding or using a chisel.
- Never use worn tools.
- Keep a fire extinguisher rated for gasoline and electrical fires handy.

If you wish to use the old plugs, clean oily deposits off with a solvent and blow dry. Then give them a three- to five-second blast in a sandblast cleaner followed by an air blast to remove any particles left behind. Repeat the sandblast until the plug is clean. But remember that prolonged sandblasting will erode the insulator, making the plug easier to foul.

When the plug is clean, bend the side electrode up slightly and file the center electrode so that it is no longer rounded. Also file the rounded edges off the side electrode. Now you can adjust the plug gap to the specifications in the manual using a spark plug gauge. Always bend the outer electrode only.

Because it will be easier to turn the engine over for other service operations without the spark plugs installed, leave the plug servicing until just before starting the engine.

Immediately after you first remove the spark plugs and make observations about the engine's condition, a compression test should be made. After removing the plugs from a thoroughly warmed-up bike, screw or press (depending on the type of gauge) the compression gauge into the spark plug hole. With the ignition off, crank the engine briskly with the kickstarter several times. The gauge should indicate a pressure increase with each kick. Continue cranking until there are no more increases. Record the final reading. Of course, you must repeat the procedure with each cylinder.

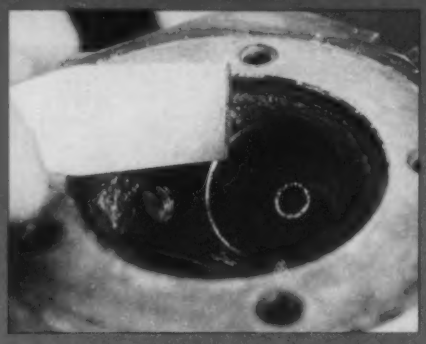
Because of many factors, no firm compression readings can be specified for any engine. However, a series of readings made under identical conditions over a period of time may reveal trouble long before serious symptoms are exhibited. A difference of 20 percent between successive readings for any one cylinder should be taken as an indication of trouble. Likewise, a difference of 20 percent between any two cylinders of a multicylinder machine also indicates trouble.

A drop in compression pressure could be caused by any one of many factors, most of which require major engine work.

To determine the cause on four-stroke engines, pour a spoonful of heavy engine oil through the spark plug opening, then hold the bike so that the affected cylinder is completely vertical. The oil will flow over the piston, temporarily sealing the rings. Repeat the compression test. If the compression is now approximately normal, you have worn piston rings and/or a worn or defective cylinder. In either case, the engine top end must be disassembled for repairs. However, it is more likely that the compression will not come up or does so only slightly. In this case, a leaking valve is usually at fault. Valve work, other than adjustment, is best left to the experts. A leaking cylinder head gasket is also possible. A rapid on-off squeal when the engine is running frequently

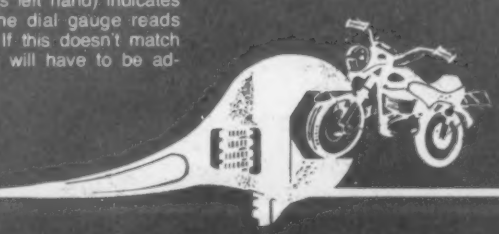
continued

Pressing the compression gauge into the spark plug hole, crank the engine over briskly until the pressure fails to increase. Record this reading and compare it with previous readings for that cylinder and other cylinders on multi-piston motors.



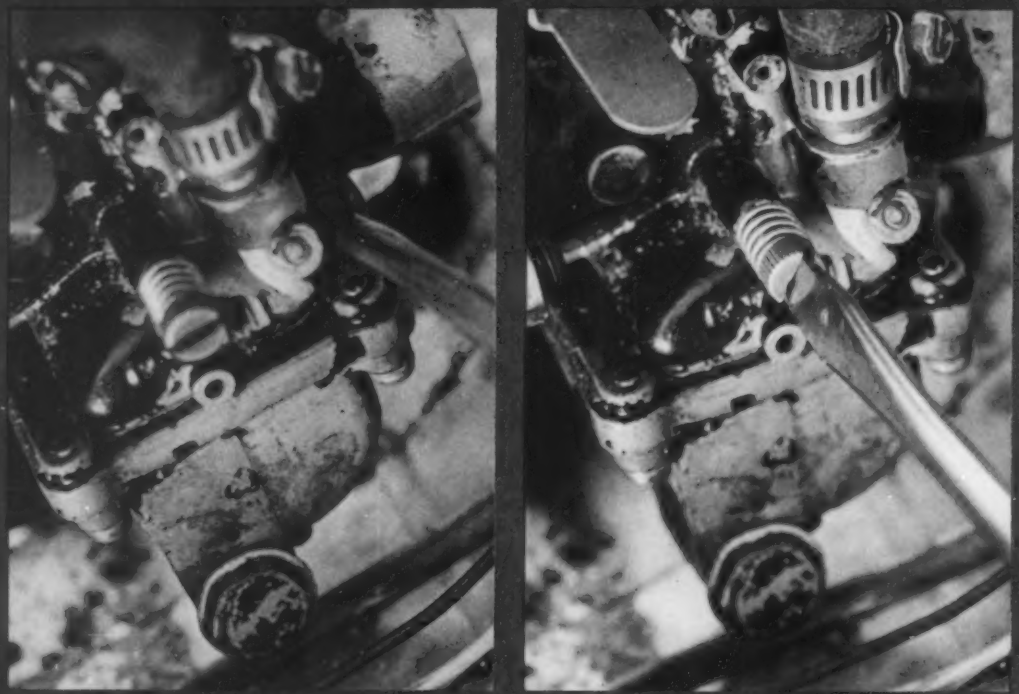
Carbon can be scraped off the cylinder head with a gasket scraper, such as this backyard mechanic is using, or the round end of a broken hacksaw blade.

When the tester (in the mechanic's left hand) indicates that the points have just opened, the dial gauge reads the distance below top dead center. If this doesn't match the manual specifications, the timing will have to be adjusted.

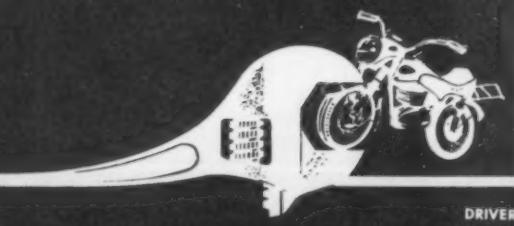


motorcycle maintenance

If you've never seen points on a motorcycle, automobile or any other gasoline engine before, they're what the ball point pen is pointing to.



To adjust the carburetor, turn the air screw (left) in until it seats lightly, then back it out 1¼ to 1½ turns. Then turn the idle speed screw (right) until the engine starts faltering. At this point turn the idle speed screw in the opposite direction until the engine runs smoothly. Repeat the idle speed screw turns once more before adjusting to obtain the desired idle speed.



continued

accompanies this condition.

On two-strokes, the problems are simpler. Since there are no valves, and the cylinder and cylinder head must come off for carbon removal anyway, ring replacement is a simple job.

Two-cycle engines are particularly susceptible to carbon formation. Deposits form on the cylinder head, piston top and exhaust port. These can increase compression, causing overheating, pre-ignition, loss of power and severe motor damage.

To remove the carbon you must first remove the cylinder head, cylinder and piston. Consult the shop manual for exact procedures for each bike. Basically, what must be done includes:

1. Allow the engine to cool to avoid cylinder head warpage.

2. Remove the spark plug(s).

3. Using a criss-cross sequence, loosen each cylinder head nut half a turn at a time until each turns freely. This also minimizes warpage.

4. Lift the head off. If it sticks, tap it lightly with a rubber mallet. Don't pry it off because you may damage a sealing surface.

To remove the carbon from the head use the rounded end of a hacksaw blade as a scraper. Be very careful not to damage the sealing surface. Use the same tool for piston head carbon removal. After cleaning the top of the piston, clear the carbon and gum from the ring grooves with a ring groove cleaning tool or broken piston ring. Deposits left in the grooves will cause the rings to stick, resulting in a power loss.

Rings are easy to remove. Spread them apart with your thumb and index finger. Start with the top one and work your way down. When putting rings on a piston, be sure the notches engage the locating pins in the grooves. When replacing the cylinder, you'll have to compress each ring just as it enters the cylinder. A ring compressor tool makes the job easier, although a screw-type hose clamp works just as well. It is possible to compress the rings with your fingers making this simple job more of a challenge.

Scrape carbon deposits from the cylinder exhaust port with a blunt screwdriver.

To reinstall the cylinder head, reverse the removal procedures. Always use a new cylinder head gasket, unless the engine doesn't have one to begin with. Torque the nuts as specified in the manual. If the specifications aren't available, torque eight-millimeter nuts 15 foot-pounds and 10mm nuts 25 foot-pounds.

Normal use causes the breaker points to gradually burn and pit. As a result, points should be cleaned and regapped every 1,500 to 2,000 miles. If they aren't too pitted, they can be dressed with a few strokes of a clean point file and all the residue removed with lacquer thinner. Don't use emery cloth or sandpaper because particles can remain and cause arcing and burning. If a few strokes of the file don't smooth the points completely, replace them. Close the cleaned points on a piece of clean white paper such as a business card and continue to pull the card through them until no discoloration or residue remains on the card. Finally, rotate the engine observing the points. If they don't meet squarely, replace them.

Although you should consult your manual, you generally get to the points by first removing the gearshift lever. Then take off the crankcase cover (an impact driver makes this job easier). Next remove the flywheel retaining nut and lockwasher. Screw the flywheel puller (usually left-hand thread) into the flywheel for its full depth before turning the puller screw clockwise to remove the flywheel. Disconnect the two point wires, then remove the attaching screw. Install the new points in the same position as those removed, then connect both wires, being sure that the terminals are clean and the connection tight. Tighten the points attaching screw only enough to keep the stationary member fr slipping as it has to move so the points can be adjusted.

However, most magneto-sparked engines have to have the flywheel installed before adjustment is possible.

Typically, you rotate the flywheel until the points are open their widest. Then insert a screwdriver between both pry points, moving the stationary point to obtain the proper gap as measured with a feeler gauge. This is another specification obtained from the manual.

Any time the breaker points are serviced or replaced, the ignition timing should be adjusted. Too early a spark may result in engine damage, while overheating and power loss result from too late firing. Typical magneto-equipped engine timing procedures are:

1. To determine piston position, mount a dial gauge or timing gauge in the spark plug hole.

2. Turn the engine until the piston is at top dead center.

3. Connect an ohmmeter, buzzer or other continuity-determining device across the breaker points.

4. Turn the engine in the direction opposite normal rotation, lower the piston about ½-inch or 13mm. The engine turns in the same direction as the rear wheel on most bikes using gears for engine to clutch reduction.

continued

continuity tester

A convenient method for connecting a continuity tester across the breaker points involves disconnecting the wire from the points at the coil. Then connect one test lead to the disconnected wire and the other lead to ground.

If you don't have a continuity tester, there are a couple of methods available.

In one case, take a lead from one side of the breaker points to the battery. Take another lead from the other side of the points through a light bulb or buzzer to the other battery terminal. The light will go out or the buzzer stop when the points open.

The other method is for motorcycles with battery ignition. Connect a voltmeter or test lamp to the points and ground. With the ignition switch on, the voltmeter will indicate battery voltage or the test lamp will light when the points open.

On engines using a primary chain for reduction, turn opposite to the rear wheel rotation. If in doubt, remove the timing gauge, put the transmission in gear and push the bike forward noting the normal rotation of the engine.

5. Very slowly rotate the engine in its normal direction until your tester indicates the points have just opened.

6. Compare the dial gauge indication with the distance below top dead center listed in the tune-up manual.

If the points don't open as specified, an adjustment will be necessary. There are two methods to do this.

The simplest may be used if the points opened within 0.02 inch (0.5mm) of the specified distance. Set the piston at the proper distance below top dead center and adjust the stationary breaker point until the tester indicates that the points just open. Be sure to tighten the lock screw and recheck the adjustment. For most bikes, ignition systems operate satisfactorily if point gap is 0.i02 to 0.018 inch (0.30 to 0.45mm).

If the ignition timing is still too far off to adjust by changing the gap, it will be necessary to move the magneto base. Readjust the point gap to the specified value. Remove the flywheel. Loosen the magneto mounting screws enough to be able to turn the base plate. If the points open at a distance greater than that specified, rotate the magneto base in the same direction as engine rotation to retard timing. On the other hand, if the piston was too close to top dead center when the points opened, turn the base opposite engine rotation to advance the timing. Tighten the mounting screws securely. Temporarily replace the flywheel and check the adjustment. Minor changes can be made by changing the gap as before.

The air cleaner should be cleaned or replaced during any tune-up. A clogged air filter causes an over-rich mixture, resulting in power loss and poor gas mileage. Two-stroke engines are very susceptible to damage from dirt entering through the carburetor. Make sure the air cleaner is not torn and fits so no dirt can get past the edges.

Tune-up time is also battery service time. Test the charge; if less than half charged (1.220 specific gravity), recharge. Add distilled water if needed. Clean the top. Also clean and tighten the terminals. If the headlight hasn't been getting brighter when the engine speeds up from an idle, it's past time to check the charging system. There are specifications in the manual for meter checking the battery and charging system of your bike.

starting checklist

Before starting any bike that's been worked on, check the following:

1. Engine oil supply
2. Transmission oil supply
3. Clutch oil supply
4. Clutch adjustment
5. Valve adjustment
6. Throttle cable adjustment
7. Drive chain adjustment
8. Engine mounting bolts
9. Ignition timing
10. Tire pressures

If your machine is going to sit for more than 30 days without being ridden, at least start it regularly, letting it run until the battery can take on a full charge again.

Carbon deposits collect in mufflers and exhaust pipes on two-stroke bikes, robbing the engine of power. To clean out the carbon, remove the baffle tube retaining screw from the rear of the muffler and pull the baffle tube out. Use a wire brush to clean all deposits from the tube. If they are too heavy, heat the tube, then rap it lightly against a solid object. Running a length of used chain through the exhaust pipe will usually rid it of carbon.

Periodic valve adjustments are necessary on four-cycle engines. Too little clearance results in poor performance and short valve life while too much causes noisy valves and the engine doesn't provide full power. Consult the manual for specifics about valve adjustments on your machine or have a mechanic perform this service.

In overcoming objections to the fuel/oil mixing for two-cycle engines, many manufacturers have developed oil injection systems. This separate engine-driven oil pump supplies lubricant and is controlled by engine speed and throttle position. This is another area where procedures for adjustment are covered in the manual. And while we're on the subject, there are many new synthetic oils available for your bike. However, a word of caution: many of these synthetics are concentrated, requiring a completely different ratio than your machine is set up for. For example, a 20-to-one ratio normally requires a quart of oil for every five gallons of gasoline, while the synthetic may require only a pint for every five gallons. Therefore, use oil designed specifically for the purpose you intend, and make doubly sure of the ratio.

Remove the fuel strainer from the petcock and clean it. Since many carburetors also have a fuel strainer at the inlet fitting, it should be cleaned in solvent and blown dry. Don't leave the fuel petcock open overnight since this floods the crankcase of two-strokes with raw gasoline, making them next to impossible to start.

Carburetor adjustments are the last engine step in maintenance since they cannot be done accurately unless all other adjustments are correct. Although you'll have to check your manual for specifics, the basic adjustments for a single cylinder bike are:

1. Turn the air screw in (clockwise) until it seats lightly, then back it out (counter clockwise) 1¼ to 1½ turns.

2. Run the machine until it is warmed up thoroughly.

3. Turn the idle speed screw until the engine starts faltering as it runs slower and slower.

4. Then turn the screw in the opposite direction until it runs smoothly.

5. Repeat steps 3 and 4.

6. Adjust the idle speed screw to obtain the idle speed desired.

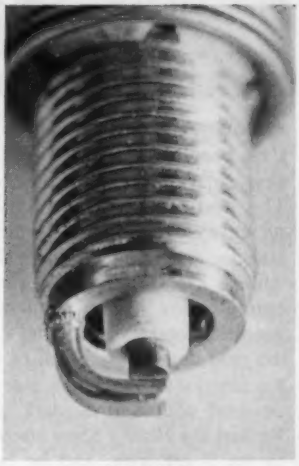
7. Ensure that there is a small amount of slack in the throttle cable when fully closed.

The engine is warm so now is as good a time as any to drain and refill the crankcase, transmission and clutch

Gasoline Fouled

Heat Range Cold

Normal



New Plug

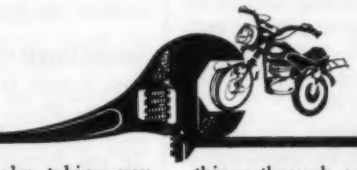
Worn Out

Splashed Deposits

Too Rich Gas

Too Rich Oil

Spark plugs tell the story of engine condition and carburetion. We've indicated the condition under these plugs. Why don't you see if you can solve the problem with the information in the text? Most manuals provide similar pictures to help you diagnose problems. If yours doesn't, check with your parts counter sales representative because spark plug manufacturers may have supplied him with picture-related problem charts.

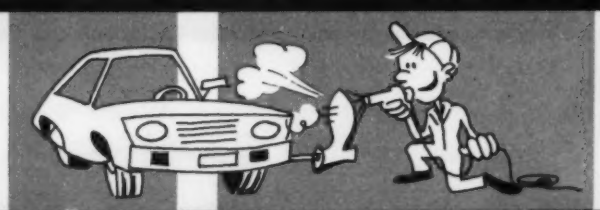


oil. Be sure you're using recommended grades and type lubricants. By all means don't use super lubricants in cycles that have common clutch and transmission oil supplies because they may cause clutch slippage.

You might think that you're ready to motor-motor . . . and you're right – at least as far as we're taking you this month. However, there is much more inspection to be completed on your bike before you're really ready to roll. Next month we'll dive into chassis service, and once you're on the road, troubleshooting. We certainly hope that you're the type who reads things through completely before starting work; otherwise we don't recommend riding that bike until you finish with the December DRIVER.

DRIVER wishes to thank Bob Amaral of Dale's Modern Cycle, San Bernardino, Calif., for his assistance in the preparation of this article.

LETTERS to the EDITOR — BACKfire



ASBESTOS DUST

I've been reading DRIVER since it first came out and find it very helpful. This past weekend I was changing the oil in my wife's car at the hobby shop and decided to check the brake linings while I had the car up on stands. Sure enough they needed replacing, so I got the necessary parts and came back the next day. On removal of the drum, the interior of the brake assembly was covered with a fine, dark gray dust. I asked the Hobby Shop attendant what to get it off with, and he handed me an air hose, nozzle, and a set of new protective goggles. I was impressed! I did the job and was careful not to breathe the dust as I blew it off the brakes. Everything went together, and the job was completed with no hitches (it has been quite a while since I read your article on brakes, but I had the Chilton's book on the car which was some help, though not entirely accurate in regards to re-assembly and disassembly).

To the POINT of this letter. Today, in my in-basket, appeared the May '79 issue of *Logistics Management Review*, SACRP 66-3, No. 79-5. On page 25 is an article "Asbestos Dust" by SMSgt Earl Wescoat. I enclose a Xerox of the page and article. Perhaps a facemask/air filter might give adequate protection to the mechanic, but that would still leave the particles blowing around. I was in a covered outdoor work space, which at least didn't leave the asbestos dust floating around indoors. I have seen quite a bit of publicity about asbestos hazards, but had no idea that I could expose myself while changing brake shoes.

Your magazine seems like one of the best ways to get the word out to us non-professional mechanics. Keep up the good work.

SSgt Frederick H. Wagner IV, USAF
PSC Box 3438
Edwards AFB, CA 93523

In the past DRIVER has recommended cleaning drums with denatured alcohol; although we've never LOUDLY come out specifically against a (un)healthy blast of air, it's about time we did underline the situation! Don't use an air hose to blow the dust away or bang a drum on the floor. For details on this and other health hazards in the auto repair shop see "Trouble in the Auto Repair Shop," December 1977 DRIVER.

MILITARY STANDARDS

As a loyal reader and avid supporter I feel compelled to do two things. One is to congratulate you on a super publication, that's the "attaboy." My second compulsion, an "aw-heck," is to inform you that your front and back cover of the August issue doesn't say much for military standards. I realize that the two gentlemen on the front cover are engrossed in checking out a "super car" and the lady on the back cover has her hands full; however, that does not excuse the absence of hats on all three. It is very difficult to enforce military standards in the USAF. Please stop making it harder.

CMSgt J. Treado, USAF
1908B Seneca
F E Warren AFB, WY 82001

We really do try to watch the standards, but in these two cases hats are deliberately missing. The T-Bird photos were taken on the flight line, where hats can be FOD objects, and on the back cover we wanted to give the feeling that Dawn's hat was dropped in the car when the kids got out of control–the harried-mother bit.

UNINSURED MOTORISTS

Just a note regarding your "Motorcycles, etc." article on pages 18-21 in the August 1979 DRIVER. On page 19 you discuss various forms of insurance coverages. The portion dealing with UNINSURED MOTORISTS coverage may be misleading to many of your readers.

I had the unfortunate first-hand experience of having my car about totaled by a driver who ran a stop sign and hit me broadside. The driver was driving with no license, and no insurance! I knew that my policy had the "Uninsured Motorists" clause and thus felt confident that even though the other party was not insured, I could at least get my wheels fixed.

After placing a call to my agent in this regard, I was informed that Uninsured Motorists coverage does *not* pay for vehicle repairs! It does pay for repair to *you* if you are hurt in your car by another party who does not have insurance, and that's all it covers.

You might contact a few insurance companies in your area to confirm this, but I feel certain you will find that "Uninsured Motorists" is a very misleading phrase to say the least. One may have visions of not having to worry if his/her car, cycle, truck, or whatever is wiped out, even if parked at the curb while you sleep, if it is reduced to junk by someone without insurance . . . not so. This is an area that needs expounding upon, and many insurance agents will not take pains to explain just what is or is not covered by this clause (it's a money maker), but the reading and driving public should know that "what it sounds like . . . ain't what it is."

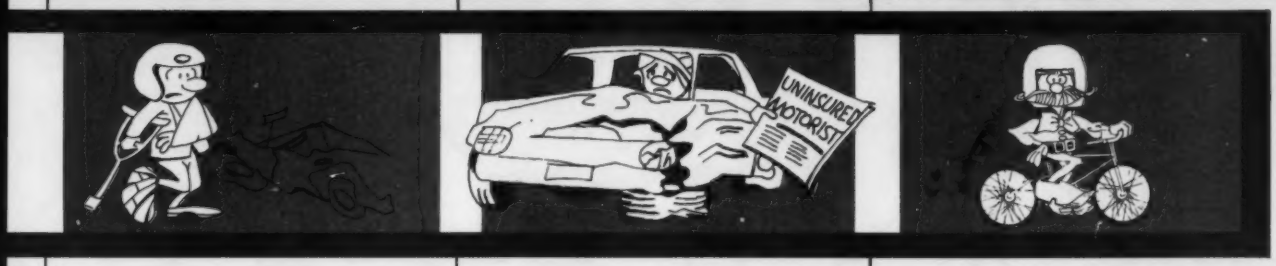
Keep up the good work. DRIVER fills in many, many safety gaps that are bound to save lives and money.

SMSgt Charles E. Seastrand, USAF
60 ABG/SS
Travis, AFB, CA 94535

Sorry if we mislead anyone. We thought we were clear but a re-reading of the article shows us we weren't. Sergeant Seastrand is exactly right. Uninsured Motorist coverage takes care of medical bills if you are injured by an uninsured driver. Collision and comprehensive coverage take care of your vehicle. (If your policy is $100 deductible (most are) and you receive $100 damage caused by an uninsured motorist, you're out of luck, too.)

CHANGING ATTITUDE

I wish to thank you and your staff for producing a magazine of such high



quality and with a much needed message. I don't always get every copy of DRIVER, but those that I do get I just have to read cover to cover.

I have just completed the Virginia Defensive Driving course. I feel that a combination of the course and DRIVER have helped me change my attitude towards driving, but especially speeding. I have finally come to the realization that all speeding will do for you is maybe (?) get you there five to 10 minutes sooner; cost you money in speeding tickets; cost you money in higher insurance rates; cost you money in using more gas; and cost you in your health, i.e., additional stress on your nerves and possible injuries or death from an accident; and psychological release, i.e., venting anger or adrenaline, or to build up your ego by passing everyone. To make up for the few minutes gained in speeding, plan your trip so you can leave earlier. Psychological release can be better obtained by physical exercise. I obtain it through calisthenics, hiking, canoeing, and skydiving. Skydiving is one of the safest sports and easy on the wallet.

Once again, keep up the good work.

Sgt Jeffrey M. Gaylord, USAF
2044th Comm Gp/DONOC
Washington, DC 20330

TRIGGERING STOPLIGHTS

I thoroughly enjoy your magazine and have been a regular reader for 8 years. I am also an avid motorcyclist and belong to that elite group that have been riding for over 10 years without destroying a major part of themselves or their bikes.

I read a letter in your August issue from TSgt Couch and I think that I have at least a temporary solution to his and other *experienced* riders' similar problems. I have found that most of the stoplights that fail to respond to a motorcyclist are weight sensitive. Often, you can spot the cut-out section in the pavement where the sensor is placed. If while slowing for the light you apply more pressure to the front brake in such a way that most of the weight is on the front wheel as it rolls over the sensor, the additional weight will often trip the light. This procedure has obvious problems for the novice and even for the experienced rider in certain conditions, such as rain or oil spots. Under good conditions, however, it can save a tremendous amount of frustration. Keep up the good work.

Lt James B. Willis, USCG
23 Iron Street
Ledyard, CT 06339

BICYCLING SAFETY

Although I don't have a driver's license I read DRIVER regularly and find it most informative. I enjoy the humorous slant you often employ to get a point across and your "interviews," such as the one in July with Dr. Cornelius Van Pool. What I'm writing to you about is in the same category as pooling: this is commuting by bicycle.

All the things that apply to motorcycles apply as much or maybe more to bicycles. These things include: invisibility due to being perceived as a non-threat to the average motorist, proper clothing and wearing of a bicycle helmet (proper clothing for a bicyclist is shoes, and close-fitting but non-restrictive clothing to allow for maximum movement of arms and legs), and practice riding and handling the bicycle (especially multiple-speed bikes) before taking on traffic.

All you motorists, please watch out for those of us on bicycles. Not all people on two-wheels are children or old people. More and more of us are serious cyclists. We know and obey traffic regulations; we ride on the same side of the road you do. We have a right to safely use those roads too.

Here are some facts about bicycles that drivers of motor vehicles may not realize: A 10-speed pedalled by a skillful rider can easily reach and maintain city speed limits. That same bike requires *more* stopping distance for the same speed that does a car. A bicycle (same as a moped or motorcycle), even though used for recreation, is *not* a toy and riders of same should *not* be considered children but treated with the same courtesy and respect as any other vehicle operator.

The day has come when you will see more and more serious bicyclists on the roads alongside motorists. If things keep up the way they are, some of you may well find yourselves on bicycles out of necessity. I'm not asking everyone to give up their cars, but I enjoy riding my bike. All I'm asking is that I be allowed to do so in peace and relative safety. I will ride my bike in as skillful a manner as possible if you will please watch out for me.

I get as annoyed at "wrong-way" cyclists as you do. Serious, knowledgeable cyclists don't make such mistakes, and we really are working at putting all riders (young and old) into that category.

Pass it on, and let's all be safe.

Sgt Angela D. Brunn, USAF
Box 843
APO New York 09240

DOUBLE CLUTCH

continued from page 2

The current issue of *The California Highway Patrolman* says, "Are you getting full service at a full-service gas station? That's why you're paying extra over self-serve. What is full service? In addition to the attendant pumping your gas, he/she should check your oil, tire pressures, and clean the windshield. If the attendant doesn't, you should complain to the oil company that supplies the station's gas. And don't be surprised if you get your money refunded."

Well, we'd be surprised. But the point is, if you don't automatically get the routine checks you want, ask for them. You'll probably have to ask for a battery check since stations don't sell battery water. Yet. Any problem, go to the station manager first.

☆U.S. GOVERNMENT PRINTING OFFICE: 1979—683-215/1

HIEROGLYPHICS

The new national system of highway warning and directional signs depends on color, shape and symbol rather than words. Shown here are those you should recognize immediately. There are many others which tell you where airports are, direct you to parks, and show you where food and lodging is available. Color has special meaning on the new signs: Red: Stop or prohibition. (A red circle with a diagonal bar indicates a prohibited activity.) Green: Movement permitted, directional guidance. Blue: Motorist-services guidance. Yellow: General Warning. Orange: Maintenance and construction warning. Brown: Recreation and scenic guidance. Lane markings on highways are being made uniform. Yellow lines between opposing traffic; white lines dividing traffic going the same way. Solid lines for no passing; dashed lines for passing.

CROSS-WALK

TRAFFIC SIGNAL AHEAD

CROSSING AHEAD

RIGHT LANE ENDS, MERGE LEFT

TWO-WAY TRAFFIC

SCHOOL CROSSING

MERGING TRAFFIC

HILL, LOW GEAR

KEEP RIGHT

NO RIGHT TURN